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AN INTRODUCTION TO MATHEMATICAL PHYSICS, by R. A. Houston. New York, Longmans, 1913. 9 + 199 pp. \$2.00.

MEMORANDA MATHEMATICA; a synopsis of facts, formulæ, and methods in elementary mathematics, by the head master of the Kingswood School, Bath, England. Oxford, University Press, 1912. 4 + 272 + 28 pp. \$1.75.

LIFE ASSURANCE PRIMER; a textbook dealing with the practice and mathematics of life insurance, for advanced schools, colleges, and universities. 3d edition, revised and enlarged, by H. Moir. New York, Spectator Co., 1912. 7 + 230 pp. \$2.00.

PRACTICAL MATHEMATICS; being the essentials of arithmetic, geometry, algebra, and trigonometry, in 4 parts. Parts 1, 2, by C. I. Palmer. New York, McGraw-Hill Co., 1912. \$0.75 each.

GEOMETRICAL OPTICS, by A. S. Percival. New York, Longmans, 1913. 6 + 132 pp. \$1.50.

A COURSE IN THE PRINCIPLES OF MECHANICAL DRAWING, by J. B. Whitmore. Columbus, O., Champlin Press, 1913. 2 + 2 + 72 pp. \$1.85.

RELIABLE INTEREST TABLES, by E. V. Williams and G. G. Bodeen. Fresno, Cal., Bankers Novelty Co., 1912. \$3.50.

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## BOOK REVIEWS.

*New Analytic Geometry.* By PERCEY F. SMITH, and ARTHUR SULLIVAN GALE. Ginn and Company, Boston, 1912. x+342 pages.

This new book on analytic geometry is considerably smaller than the *Elements of Analytic Geometry* by the same authors. Much of it follows, word for word, the old book, but many parts have been rewritten and rearranged. The book has been made smaller by shortening the work on the conic sections and by omitting the chapters on euclidean transformations, inversion, and poles and polars. The conics are defined separately, the parabola in terms of focus and directrix, and the ellipse and hyperbola in terms of their foci alone. They are studied by means of their equations in rectangular coordinates rather than by means of polar coordinates as was done in the beginning of the chapter on conics in the old book.

A special feature of the book is the new chapter on "Empirical Equations." The finding of equations to represent, at least approximately, curves given by experiment is not discussed in the current books on analytic geometry, although it is one of the most important parts of the subject for those who use analytic geometry in physics, experimental psychology, and statistics. Eleven pages are given to it in this book.

Another new chapter is on "Functions and Graphs." It is mostly a study of maxima and minima of functions without the use of the calculus. Practical problems in maxima and minima are given to be solved experimentally by means of carefully drawn graphs.

The work on transcendental curves and equations in rectangular coordinates is more extensive than in the old book and has been made into a separate chapter. It includes the graphical solution of transcendental equations, and some tables to lighten the work of computation. The authors say truly in the preface that a student loses interest in a function if he cannot calculate rapidly its numerical values. It is for this reason that they have put in the first chapter tables of squares and cubes, square and cube roots, and three-place tables of logarithms and trigonometric functions.

The book is considerably larger than the *Introduction to Analytic Geometry* by the same authors.

W. H. BUSSEY.

*Mathematical Recreations and Essays. Fifth Edition.* By W. W. ROUSE BALL. Macmillan and Co., London, 1911. xvi+492 pages.

A great deal of new matter has been added to this interesting book since it was first published in 1892. The fifth edition contains almost 250 pages more than the first and about 100 pages more than the fourth. The work on "Kirkman's School-Girls Problem" has been enlarged and made into a separate chapter. There is a paragraph on the same problem as proposed independently by J. Steiner in a somewhat more general form. There is a new chapter of 20 pages on "The Parallel Postulate," and one of 6 pages on the "Insolubility of the Algebraic Quintic." Those who amused themselves in their youth by making figures known as *Cat's Cradles* by twisting on the hands a loop of string will be interested in the new chapter on "String Figures." The subject is more extensive than most people think. The chapter is 32 pages long and is not supposed to be a complete discussion. It is only indirectly connected with mathematics. The author explains the presence of it and the older chapters on "Astrology" and "Ciphers" by saying that he deliberately gave the book a title which would allow him a free hand to write what he liked.

The parts of the book which are not new have been revised. In the chapter on mechanical recreations, after a discussion of the cut on a tennis ball and the spin on a cricket ball, the author has put in a paragraph on the flight of golf balls. In the chapter on matter and ether theories, he has added a page on the principle of relativity. These are typical instances of the way in which the book has been brought up to date.

W. H. BUSSEY.

*An Elementary Treatise on Cross-Ratio Geometry, with Historical Notes.* By Rev. JOHN J. MILNE. Cambridge University Press, 1911. xxiii+288 pp.

It is well known that our literature on secondary mathematics is too limited. The ambitious teacher of secondary mathematics, who reads English only, does not possess as good facilities for broadening his knowledge as do his German and French colleagues. Recently there has been considerable improvement along this line, and the volume before us is another step in the right direction.